

may occur in all the species, and may be as general a character of the order as the beautiful markings in the cuticle of the petals are well known to be.

Other orders have been examined which are said to have a near affinity with *Geraniaceæ*, but none of the plants examined, belonging to the orders *Balsaminaceæ*, *Tropæolaceæ*, *Oxalidaceæ* or *Linaceæ*, manifest anything like the appearances described—in fact no clustered crystals have been met with; but in taking an order said to be somewhat more remote, *Malvaceæ*, I find in all the examples that I have examined of British and foreign plants, precisely a similar disposition and number of crystals.

If the leaves constituting the involucrem of *Althæa*, *Malva* and *Pelargonium* be carefully examined, a few crystals will occasionally be found, but altogether not in the slightest to be compared with the number or disposition of those in the sepals.

If constitutional peculiarities, besides structure, have any influence with systematists, then *Malvaceæ* ought probably to be placed somewhat nearer *Geraniaceæ*; and when we consider the monadelphous condition of the stamens of both orders and their tendency in *Monsonia* to be indefinite, and the carpels of some plants of *Malvaceæ* to have but one seed, exalbuminous, and to be disunited, and the parts of the flower of the same numbers, there appears to be some reason, as far as the structure of the reproductive organs is concerned, to bring the position of these orders in closer relation.

The sepals of most plants are favourable organs for meeting with crystalline bodies, either of the solitary, acicular or clustered varieties. The sepals of *Prunella vulgaris* and *Dianthus caryophyllus* exhibit well the solitary cubic crystal beneath the cuticular cells; the Fuchsias contain a great quantity of the acicular kind, and the sepals of the Strawberry exhibit the clustered variety as seen in the *Geraniaceæ*. Thus it appears that there is something peculiar to the sepals of certain plants that disposes the contents of their cells to form crystals which does not belong to the neighbouring organs.

50 Wellclose Square, July 4, 1846.

XI.—*Remarks on certain Genera belonging to the Class Palliobranchiata.* By WILLIAM KING, Curator of the Museum of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne.

[Continued from p. 42.]

PENTAMERUS.

THE beak of *Pentamerus* is furnished with an aperture of the form of a triangle, the base of which corresponds to the hinge

line, and the apex to the rostral point. Owing to the great incurvation of the beak in some species (*P. Knightii*), the aperture is concealed, except in the young state; but other species (*P. conchidium*), in which the beak is slightly incurved, have it exposed during their entire existence. Nothing more need be said to show that the aperture is the same as the open deltidium of *Spirifer*, &c. From the sides of the deltidium two plates extend to within a quarter of their length of the frontal margins of the shell, at the same time decreasing in depth and gradually becoming more and more separated from the roof of the valve to which they belong, till their extremity, which is reduced to a mere point, is within an eighth of their length of the inner surface or floor of the opposite valve (*P. conchidium*). Both plates are conjoined superiorly throughout their entire length; and as they follow the curve of the upper valve, though somewhat more sharply, they form as it were a longitudinally curved arch-shaped process, which strongly resembles the upper mandible of a parrot, supposing the base of the mandible to be attached to the sides of the deltidium. At their point of attachment to the cardinal margin, the plates are thickened, or rather converted into two condyles, which fit into a pair of sockets excavated in the corresponding part of the opposite valve: in this mode of articulation, *Pentamerus* agrees with all the dentigerous palliobranchiate genera.

Owing to the different degrees of incurvation of the beak in different species, the arch at its posterior end, that is, where the plates are attached to the sides of the deltidium, presents some widely different appearances: thus in *Pentamerus galeatus*, in which the beak curves so much downwards as actually to overlap the *natis* of the opposite valve to some extent, the arch, from the condyles to the rostral point or apex of the umbone, is doubled up as it were; whereas in *Pentamerus conchidium*, in which the beak extends considerably behind the hinge line, the corresponding part of the arch is completely unfolded.

Besides being connected with the sides of the deltidium, the arch is attached to the medio-longitudinal line of the roof of the dorsal valve by means of a vertical plate extending along its crest, from the posterior to nearly the anterior extremity. The length and depth of this plate vary according to species: in *P. conchidium* and *P. Knightii*, its superior margin embraces the posterior three-fourths of the length of the shell; but in *P. galeatus* and *P. bashkiricus* it extends no further than the centre; and as the arch falls lower in *P. Knightii* and *P. galeatus* than in *P. conchidium* and *P. bashkiricus*, this plate is consequently deeper in the former than in the latter.

The ventral valve (of *Pentamerus galeatus*) is furnished with

two outwardly-inclined plates extending from the *socket-walls* to the centre, a distance exceeding, by one-fourth of their length, the anterior extremity of the arch. Both plates are attached to the inside or floor of the valve, at a little distance from each other, nearly their entire length, gradually increasing in height and becoming more divaricated as they advance. Looking down upon the plates, their posterior half is seen at first, that is, commencing from the floor of the valve, leaning outward, then to turn inward, and again to turn outward; this brings their superior margin nearly in contact with the postero-lateral margin of the valve to which they are attached: their anterior half is simply inclined outward at first, and then inward; the difference being caused by the absence of the superior eflexed portion, which, decreasing in depth somewhat rapidly in its progress, is not carried beyond the middle of the plate: in *Pentamerus Knightii* the superior eflexion is carried much further forward, and it appears to be the same in *P. conchidium*.

Although there is considerable dissimilarity between *Pentamerus* and other palliobranchiate genera, yet I cannot agree to the amount of difference contended for by M. Verneuil, who recognises little or no identity between the parts composing the internal apparatus of the former, and those entering into the composition of its homologue in the latter*.

In the first place let us consider the arch of *Pentamerus*. The position of the plates composing this arch, relatively to the deltidium, and their subserviency to articulation, place beyond doubt their strict identity with the condyle plates of other Palliobranchs. This view was first advanced by Von Buch, from an examination of *Pentamerus conchidium*†. In *Productus*, &c. the condyle plates are never seen; in *Terebratula* they are only partially present; while in *Spirifer*, *Atrypa*, *Hypothyris* and *Orthis*‡, they are rarely absent. In those shells which are provided with them, the position of the condyle plates relatively to each other is often very different: in many *Orthises*, *Atrypas*, *Hypothyrises* and certain *Terebratulas* (*T. elongata* and *T. hastata*), they vary slightly from the perpendicular; in certain *Orthises* (*O. eximia*, *O. crenistria*, &c.), and most of the *Spirifers*, they strongly incline towards each other superiorly, but without coming in contact; in *Spirifer heteroclitus*, *Orthis adscendens*, *Uncites Gryphus*§,

* Geology of Russia, vol. ii. pp. 107, 108 and 109.

† Ueber Delthyris, &c.

‡ The condyle plates are rudimentary in *Orthis senilis*, *O. Wangenheimi*, &c. The peculiar twist of the umbone in *O. senilis*, &c. is probably owing to the absence of the condyle plates.

§ This singular shell has the condyle plates forming a remarkably flat-

Atrypa undata, and in the Camerophorias, they curve in and conjoin at their upper margin so as to form an arch more or less resembling that of *Pentamerus*.

With reference to the suspending plate of the Pentameruses, its position, and its connexion with the arch or condyle plates, establish its identity with the mesial plate, which serves to distinguish certain genera and certain species. In *Spirifer cristatus*, *S. Walcottii*, *S. rostratus*, *Zeiten*, *Martinia imbricata*, &c., this plate, which is large, is situated between and independent of the condyle plates; in *Strigocephalus* it is a well-known internal appendage; in *Spirifer heteroclitus* it is largely developed in comparison with the condyle plates, which are cemented to the lower part of its sides; in *Orthis adscendens* and the Camerophorias it is comparatively small, and attached to the crest of the arch as in *Pentamerus*; in certain *Orthises*, and in the *Lep-tænas*, it exists under a rudimentary form, projecting a little below the central line of their remarkably flattened arch-shaped process*.

tened arch, separated from the roof of the deltidial valve as in *Pentamerus conchidium*, but not suspended as in this species by a mesial plate. The arch is so flat and the *natis* of the opposite valve passes so close up to its under surface, especially in old specimens, as to leave little or no opening for a pedicle; indeed I suspect that this part only belonged to young individuals. I am not acquainted with the armature of the opposite valve of *Uncites*, it is therefore difficult for me to form any positive conclusion as to its generic affinities. In the synoptical table it is placed in the family *Terebratulidæ*, on account of its resemblance to *Pentamerus conchidium* in a few particulars.

* The most remarkable internal structure that I know of is to be seen in the dorsal valve of a shell labelled "*Terebratula concentrica* from the Eifel," specimens of which I owe to the kindness of M. de Verneuil and Mr. W. R. Loftus. In this species the condyle plates are attached to a process, which, to use a homely comparison, resembles a shoe-lifter. Imagine a process of this kind, about a third of the length of the shell, with its narrow end fitting into the rostral point, and its lateral margins attached to the inside of the dorsal valve along its medio-longitudinal region; then imagine the superior margin of the condyle plates attached to its under or convex surface, one on each of, and along, its sides, and a tolerably correct idea will be formed of this singular apophysis. To complete the internal structure of this shell, I may add that its lower valve is furnished with a deep mesial plate, which supports a concave crural base, and that it possesses a pair of spiral appendages,—the latter character added to its external form is in favour of this shell belonging to *Atrypa*: whether it should be made to form another genus I am not at present prepared to offer a positive opinion. Notwithstanding its dissimilarity to all other known Palliobranchs in its internal structure, I am led to suppose that the apparatus of the dorsal valve of this species is a modification of those condyle plates (in many *Spirifers*) which are drawn in towards each other at their superior half as here represented: what is required to convert such a pair of condyle plates into the apophysis of *Atrypa concentrica* is the approximating parts



The plates of the ventral valve, as they are prolongations of the socket-walls, must be considered as identical with the socket-plates to be seen in certain palæozoic species, as *Orthis eximia*, *Spirifer cristatus*, *S. striolatus*, Meekl., *Hypothyris*? (*Terebratula*) *nucella*, &c., and which are characteristic of that singular Silurian group described by Pander under the name of *Porambonites*.

It requires to be mentioned, that in a great many of the shells lately cited, I have cleaved the plates of the dorsal valve in the same manner as it is usual to divide those of *Pentamerus*, which proves that they are composed of two united lamellæ. M. Verneuil seems to be of opinion, that it is in *Pentamerus* alone that the plates (at least the mesial one) possess a bilamellar structure, and that this shell is therefore essentially distinguished from all other palliobranchiate genera. In some of the shells that I have broken up, the lamellæ separate as freely as those of *Pentamerus*; in most they are not quite so easily divided, and in a few there is some difficulty in separating them; the difference, it is highly probable, being simply due to the more or less intimate union of the two lamellæ of which they are composed.

STRIGOCEPHALUS.

This genus possesses an area furnished with a deltidium, which is open in young individuals and cicatrized in those fully grown; in individuals of an intermediate age, the cicatrix exhibits a small circular opening, which resembles the entire subapical foramen of *Hypothyris obsoleta*, &c.

The inside of the dorsal valve is furnished with a mesial plate, resembling that which suspends the arch in *Pentamerus*: it extends from the umbonal cavity to within a third of its length of the anterior margin of the valve, increasing in depth as it advances. With the exception of two slight ridges running into the condyles, there is no other vestige of an arch-shaped process.

In the ventral valve, a massive slightly curved process (the concave side being upwards) stretches from the middle of the hinge to a little behind the centre of the opposite valve, where it clasps as it were the mesial plate by means of a bifurcated extremity; in other terms, this extremity is notched, which actually enables the process to pass to a little more than an

to become confluent as in this diagram, which represents a transverse section of the apparatus enlarged. Another modification of the condyle plates is to be seen in *Spirifer mosquensis* and *S. rostratus* (that is, the Jurassic shell so named by Zeiten), which have them so much prolonged as nearly to touch the frontal margin of the valve to which they are attached. (Vide Geology of Russia, vol. ii. for the former species, and Von Buch on *Delthyris* for the latter.)



eighth of an inch of the inner surface of the dorsal valve, leaving thereby just sufficient space for the thickness of the animal's mantle. I am not aware that any opinion has been hazarded on the use of this singular process; there is every reason to believe however, from the remarkable modifications which the cardinal muscular fulcrum occasionally undergoes, that both are strictly homologous. In some fossil Terebratulas the cardinal muscular support is erect and unusually elongated, particularly in a cretaceous species, probably *T. pectiniformis*; it appears to be the same in *Orthis eximia*, Vern.; and in the existing *Terebratula rosea* it is very much lengthened, but situated on an elevation rising out of an excessively dilated cardinal plate.

In the hinge of the same valve are situated two depressions or sockets for the condyles of the dorsal valve, one on each side of the cardinal muscular support: the socket-walls are very much expanded laterally, so as to form two prominent plates, which descend, curving in towards each other at the same time, to a little below the origin of the cardinal muscular support, where they nearly touch a slightly elevated vertical plate, which stretches to about half-way along the medio-longitudinal line of the valve. Their origin and position, and the peculiarity next to be described, are highly in favour of these plates constituting a divided crural base*. Each of the crural plates, on its lower part, gives off a slender lamelliform process, which curves (the concave side upwards) towards the anterior end of the mesial plate of the dorsal valve, but a little to one side of it; the process now makes a sudden bend upon itself, curves downwards and postero-laterally, till it nearly touches the end of the cardinal line; here it makes a sharp forward curve, runs along the side, and afterwards along the front of the valves, at the distance of a quarter of an inch from their margin, to nearly the medio-longitudinal line of the shell; further I have not been able to trace it. This is the course of both processes: they thus form two symmetrical subgyrate appendages, which remind one of the spiral coils of the Spirifers and the folded loop of the Terebratulas. It is to be hoped that sufficient has been adduced to show the generic difference between *Strigocephalus* and *Pentamerus*, which has occasionally been doubted†. The difference is such as to induce me to place the former in the family *Spiri-*

* This view is further supported by the striking resemblance which these plates bear to the concave crural base of *Martinia* (*Terebratula*) *hyalina*, Buch. This species is interesting in another point of view, as from its external resemblance to *Strigocephalus*, we are warranted in supposing that both are intimately related to each other, although belonging to separate genera.

† "The difference between *Strigocephalus* and *Pentamerus* appears to me not very important."—Phillips, Palæozoic Fossils of Cornwall, &c., p. 55.

feridæ, and the latter in that of *Terebratulidæ*. Besides its subgyrate processes and its deltidium (which when the shell is young has precisely the character of that of the Spirifers), its close resemblance to *Martinia* (*Terebratula*) *hyalina*, Buch, both as regard external characters and the crural base, are eminently in favour of *Strigocephalus* belonging to the *Spiriferidæ*; and the probability is even great that it is directly allied to the genus *Martinia*.

CAMEROPHORIA.

Some years ago I was struck with the remarkable difference between the casts of a magnesian limestone *Terebratula* and those of every other species with which I was then acquainted. Judging from casts of the dorsal valve of the latter, it was obvious that the umbonal cavity had been either furnished with two vertical condyle plates, generally divaricating as they passed from the beak, or unprovided with any kind of armature; but in the former there had evidently been an arch-shaped process, suspended from the roof of the umbonal cavity by a shallow plate. The contrast between casts of the magnesian limestone shell and of certain carboniferous species (*Hypothyris pleurodon*, *H. pugnis*, &c.) closely allied to it by external characters, was particularly striking. In 1840 Dr. Goldfuss kindly favoured me with some casts of a fossil labelled "*Pentamerus Knightii* from Hohenzolen," when I was immediately struck with their resemblance to the magnesian limestone species, which I at once concluded to be a *Pentamerus*; but on a further comparison I became convinced that there was a decided difference between them in the apophysis of the ventral valve. M. Verneuil also appears to have been at first led to suppose that the magnesian limestone shell, specimens of which he collected in Russia, was a *Pentamerus*; but though M. Verneuil and myself are now satisfied that this was an error, we differ in opinion as to the value of the *internal structure* which belongs to the shell in question: M. Verneuil considers it not sufficiently marked to form a generic character; while I am led to believe that it ought to be regarded as diagnostic of a new genus, for which the name *Camerophoria* is proposed.

Having, by the examination of a large number of specimens of the typical species (*C.* [*Terebratula*] *Schlotheimi*) in various states of preservation, satisfied myself regarding the internal characters of *Camerophoria*, I will now proceed to describe them with reference to their generic value.

The upper or rostral valve possesses a deltidium, which is open and only exposed in young individuals; in old ones it becomes dilated at its base, and is then occupied by the umbone of the

opposite valve, as in *Pentamerus galeatus*. Two condyle plates pass from the deltidium, one on each side of it, to a third of the length of the shell; they conjoin at their superior margin, so as to form an arch-shaped process, the crest of which is attached to the roof of the valve by means of a shallow vertical plate. In no respect do these plates differ from those composing the arch and its support in *Pentamerus*, except in degree.

In the ventral valve, the space between the socket-walls is occupied with a triangular horizontal plate or platform, having two of its margins attached to the hinge, and the other one free and facing the cavity of the shell. Upon the platform is situated a rounded protuberance, which from its position and the lines or striæ on its surface, is evidently the cardinal muscular support. From the free margin of the platform arise two slender filiform processes (one on each side of and close to its centre), which curving upwards pass to the anterior end of the arch, just within touching it. Immediately below these processes, a much larger one is seen to originate, and to project with a slight upward curve nearly to the centre of the shell, and within a third of its own length of the opposite valve: it becomes considerably dilated towards its free extremity, and is concave superiorly, which gives it a spoon-shaped appearance. This process is supported by a deep vertical plate extending from the under side of the platform to a considerable distance along the medio-longitudinal line of the shell.

On comparing the armature of the dorsal valve of *Camerophoria* with that of the corresponding valve of *Pentamerus*, the strongest resemblance is visible; but as the arch and its support are occasionally seen in other genera, they cannot be considered of much value in a generic point of view: if however our attention be directed to the ventral valve, we observe a structure which cannot be disposed of so summarily. In *Pentamerus* the separation of the two socket-plates at their base is such as to afford room for the attachment of the inferior terminations of the valvular muscles to the inner surface of the lower valve. In *Camerophoria* however I am convinced that these muscles were not so attached, but that they were supported by the projecting spoon-shaped process. The reasons for this view are, that no muscular impressions are visible on the inner surface of the ventral valve; that where they only can occur, the surface is crowded with vascular impressions; and that in *Hypothyris*, an allied genus, several species (*H. acuminatus*, *H. pugnus*, &c.) exhibit the muscular impressions on *that part* of the inner surface of the ventral valve corresponding to the place in *Camerophoria* which is overspread by the spoon-shaped process. Has a valvular muscular support, in the form of a projecting process, ever been

seen in the ventral valve of any other Palliobranchiate genus? As far as my own observations extend, I have not yet become acquainted with a single instance of the kind.

M. Verneuil's principal reason for maintaining the genus *Pentamerus* is founded on an alleged wide dissimilarity between its internal apparatus and that of all other cognate genera: it has been shown however that the amount of dissimilarity is not so great: nevertheless, very few will be disposed to question the validity of this genus, inasmuch as it possesses a combination of characters peculiar to itself. This is no more than may be claimed for *Camerophoria*, which, until it is known that a projecting process for the support of the valvular muscles exists in the lower valve of other Palliobranchs, may be considered a more isolated genus than *Pentamerus*.

Reverting to the remaining characters belonging to *Camerophoria*, the platform appears to be the same as the crural base (in this case a flat one) of *Terebratula*, and may therefore have supported the inferior pedicle muscles. The filiform processes I am disposed to look upon as supports for the labial appendages and the visceral parts of the mollusk.

It may be asked, is not the valvular muscular process in the ventral valve of *Camerophoria*, the plates of *Pentamerus* united? Considering the definition previously given of a socket-plate, I am certainly disposed to think that it is not: the latter being prolongations of the socket-walls, compels us to consider them as true socket-plates; but as regards the former, its total want of connexion with the sockets, and its striking off from below the centre of the free margin of the platform, strongly support the view that it is the mesial plate to be seen in the lower valve of many shells (*Atrypa concentrica*, *Terebratula rostrata*, *Hypothyris pugnus*, *Orthis Michelini*, *Strigocephalus*, &c.) bilaterally expanded on its superior margin.

Camerophoria appears to have an extensive geographical range. M. Verneuil has collected two species in Russia, *C. Schlotheimi* and *C. superstes*, the former in the carboniferous limestone and the latter in the lowest beds of the Permian system. I have specimens of an allied species from the mountain limestone of Weardale. The genus abounds in the magnesian limestone near Sunderland, and in the Zechstein of the Thuringer-Wald: in the former locality three, if not more species are found. The strong external resemblance which *Camerophoria* bears to certain carboniferous and Devonian shells, leads me to think that it will hereafter be found to comprise a number of species*.

* As M. Verneuil's objection to the genus *Camerophoria* appears to be founded only on a knowledge of the structure of the dorsal valve, it will be unnecessary to say more than that, if the species belonging to it differed from

STROPHALOSIA.

If we examine *Productus giganteus*, *P. horridus*, &c., it will be seen that they do not possess articulating condyles nor an area. The absence of these characters has generally been urged as essentially distinguishing *Productus* from most of the Palæobranchiate genera. It is not to be denied, however, that some species of this genus may have existed possessing an area and teeth in a rudimentary or incipient state*. Considering how closely allied *Productus* is to the dentigerous and areated genera, the presence of these characters under such a condition is to be expected in some species, which in this case would be looked upon as so many aberrant forms; but when we find both the condyles and area assuming a fully developed form, and prevailing in a number of species allied to each other by other distinguishing characters; and these species belonging to three consecutive geological periods, and having a wide geographical range, it then becomes a question whether it would not be working out a natural division to group such species under a separate genus: as this is my opinion, I have been induced to form a genus for them, bearing the name *Strophalosia*.

It will now be necessary to enter more into detail respecting the distinguishing characters of *Strophalosia*. Both valves possess an area, that of the ventral valve being merely the hinge-plate thickened: the area of the dorsal valve is furnished with a cicatrized deltidium, at the base of which are situated two condyles which fit into a pair of sockets excavated in the hinge-plate of the opposite valve, one on each side of the cardinal muscular fulcrum: the umbone of the large valve is generally flattened or irregularly indented, and the entire face of the ventral valve is often furnished with spines†.

Hypothyris only to the extent that *Orthis ascendens* and *Spirifer heteroclitus* do from their respective genera, I would not hesitate to consider them as *Hypothyris*es.

* M. Verneuil places *Productus comoides* in *Chonetes*, because it possesses an area and cardinal spines. If the figures given by Von Buch in plate 1 of his memoir on *Productus* represent the internal structure of *P. comoides*, we may then be certain that this species does not belong to *Chonetes*, since the concave or ventral valve of this genus is not furnished with the crescent-shaped bodies to be seen in one of the figures just referred to, and characteristic of *Productus*. A specimen of *Productus giganteus* in the Newcastle museum exhibits what might be taken for an area, but which, instead of being an additional piece set on the hinge-plate, as is the case with a true area, is only the hinge-plate itself considerably thickened. Perhaps this is the case with the *Productus comoides* examined by M. Verneuil.

† M. Verneuil has pointed out the existence of spines on the flat valve of the so-called *Productus horrescens*. In the true *Productus*es, the spines, when present on this valve, are generally confined to the cardinal region: *Productus punctatus* and *P. fimbriatus* may be exceptions.

The whole of the foregoing characters distinguish *Strophalosia* from *Productus*, both of which agree in the form of their valves, in their dorsal valve being beset with spines, and to a certain extent in their internal structure*.

Another apparent distinguishing character of *Strophalosia* consists in its habit or mode of attachment: the flattened state of the umbone, so general to the species, goes far to prove that they were attached to foreign bodies by this part, as obtains in most of the Thecideas; further, several of my specimens of a magnesian limestone species are found under circumstances completely proving, that in addition to an umbonal attachment, they adhered to the inner surface of dead shells of *Productus horridus* by means of long creeping spines †.

The species which I purpose placing in the genus *Strophalosia* are the following: *Productus horrescens*, Vern.; *P. subaculeatus*, Murch.; *Orthis productoides*, Murch.; a Himalayan fossil, three magnesian limestone species found in the neighbourhood of Sunderland, and a few doubtful forms, as *Productus spinulosus*.

The above shells are found in the Devonian, Carboniferous and Permian deposits. They have equally as extensive a geographical range. M. Verneuil has discovered two species in Russia: three species occur in the magnesian limestone of Sunderland, one of which I have found in the Zechstein of Könitz in Thuringia: one (or more) belongs to our home carboniferous deposits: species identical with those found in Russia, and some others, occur in the Eifel and the Bas-Boulonnais: and I have specimens of a species ‡ collected by the late Dr. Gerard in crossing the boundary

* There is a slight but interesting difference between *Strophalosia* and *Productus* in their ovarian impressions or crescent-shaped bodies, which will be explained and figured in my "Monograph."

† This mode of attachment of *Strophalosia* will probably throw some light on the habit of *Productus*. Many suppose that the latter was attached by means of fibres passing out between the hinge-plates, which does not appear to be supported by any evidence: Koninck, from an examination of *Productus proboscideus*, supposes that it was attached by means of fibres passing out of the anterior opening, which would compel us to conclude that the genus did not belong to the *Palliobranchiata*. Instead of *Productus proboscideus* subserving such an office, I cannot but think that it simply served as a passage for the ingress and egress currents. The tubular form of the anterior opening is also seen in old individuals of a magnesian limestone *Strophalosia*. As the convex valve of *Strophalosia* was attached, I am led to believe that the same valve of *Productus* was the inferior one, as is the case with *Pecten dentatus*, *P. Jacobæus*, and others having the byssal sinus or notch in the large valve.

‡ This is the shell which Dr. Gerard alludes to in his Journal as resembling an oyster (vide Asiatic Researches of the Bengal Society, vol. xviii.). As it does not appear to have been named, I embrace the present opportunity of dedicating it to this enterprising traveller, and drawing up a provisional specific character for it.

Strophalosia Gerardi.—*External Characters*. Form oval; width greater

of Ladákh and Bis-áhár, in the Himalayas, at an elevation of 17,000 feet above the level of the sea.

Strophalosia and *Productus* are placed in the synoptical table in a family distinct from that of *Strophomenidæ*, because from all the genera of the latter they are distinguished by the form of their ovarian spaces and the presence of spines. In the former character some of the *Strophomenas* (*S. transversalis*, *S. oblonga*, &c.) appear to approximate them; and in the latter they are assimilated to a certain extent by *Chonetes*.

XII.—*Excursions in Upper Styria, 1842.*

By R. C. ALEXANDER, M.D.*

ON the 2nd of July I visited the romantic ravine between Arzberg and Gutenberg, and found *Pyrola media*, *Saxifraga elatior* (M. and K.), *Aizoon*, *rotundifolia*, *Sedum dasycyllum*, *Rhododendron hirsutum*, *Athamanta cretensis*, *Teucrium montanum*, *Scrophularia canina*, *Euonymus latifolius*, *Dianthus plumarius*, *Hieracium incisum*, *Mæhringia Pona*, *Peltaria alliacea*, *Arenaria laricifolia*.

On the 7th of July I was on the Schöckel, a mountain above 5000 English feet high, near Gratz, and found *Ranunculus alpestris* and *aconitifolius*, *Hieracium villosum*, *Botrychium lunaria*, *Saxifraga controversa*, *Soldanella alpina* in fruit, *Spergula saginoides*, *Anthemis tinctoria*, but was prevented by heavy rain from continuing on the mountain.

On the 15th of July I was on the Lantsch, and found *Astragalus Cicer*, *Mæhringia heterophylla*, Koch (*diversifol.* Doll.), *Melica ciliata*, *Sambucus racemosa*, *Myagrum paniculatum*, *Sempervivum hirtum*, *Androsace lactea*, *Aronicum Clusii*, *Carex atrata* and *firma*, *Chrysanthemum corymbosum*, *Cotoneaster vulgaris*, *Centaurea montana*, *Cortusa Matthioli*, *Carduus personata*, *Dryas octopetala*, *Geum rivale*, *Gymnadenia conopsea* var. *minor*, *Lonicera nigra*, *Orchis globosa*, *Ribes alpinum*, *Sonchus alpinus*, *Silene acau-*

than the length in the proportion of six to five. [The specimens examined are $1\frac{1}{2}$ in. wide and $1\frac{1}{2}$ in. long.] Upper valve convex, the convexity, which is greatest over the cardinal line, equal to one-third of the width of the shell: opposite valve concave, the concavity equal to half of the convexity of the upper valve. Umbone rounded, slightly prominent. Area: length equal to half the width of the shell, depth equal to one-sixth of its own length. Deltidium, the base one-third the length of its side. Spines of the dorsal valve adpressed, none exceeding a quarter of an inch in length, distant from each by a space equal to twice their diameter (which is the sixteenth of an inch in the largest spines): spines of the ventral valve (specimens imperfect in this particular).—*Internal Characters* (unknown). The formation to which this species belongs has not yet been ascertained: one of my specimens is associated with a *Venestella*. It is from the crest of a pass near the boundary of Ladah and Bisahar at an elevation of 17,000 feet.

* Read before the Botanical Society of Edinburgh, April 9th, 1846.